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This programmed course consists of four lessons which cover the general principles of indexing, the specific methods of coordinate indexing, and the use of the Educational Resources Information Center (ERIC) Thesaurus. In the first volume the five appendices contain: (1) an index to the major themes of the course, (2) some definitions of form categories used in Lesson 2, (3) a bibliography of 67 items related to indexing, classification and thesaurus building, (4) three demonstration documents used in Lessons 3 and 4, and (5) a sample form for candidate descriptors. Lessons 1 and 2 are contained in volume 2 of the series (LI 000 815), and lessons 3 and 4 in volume 3 (LI 000 816). (CM)

INDEXING FOR ERIC

Vol. 1

INDEXING FOR ERIC

A Programmed Course

Volume 1

PREFACE and APPENDICES

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

This course was produced at the School of Library and Information Services, University of Maryland, under grant from the Office of Education.

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August 1967

PREFACE

The course consists of four lessons which cover the general principles of indexing, the specific methods of coordinate indexing, and the use of the ERIC Thesaurus. The latest version of this available to the course designers was the Interim edition of January 1967 with the May cumulative supplement.

Each lesson has an optimum time of approximately 90 minutes and should be completed at one sitting. The whole course should not be spread over more than 7 days.

The appendices which follow contain:

A. An index to the major themes of the course. This should not be used before or during the course. It provides quick reference for those who have already been through the course.

B. Some definitions of form categories (referred to in Lesson 2).

C. A bibliography for those who wish to pursue the study of indexing after completing this course.

D. Demonstration documents. These are required for Lessons 3 and 4.

E. Sample forms for candidate terms.

APPENDIX A.

Index for quick reference to the major concepts dealt with in the course. (References are to lesson and page number: e.g., I 25)

APPENDIX B.

Some definitions of form categories.

Controlled Experiment

"An investigational procedure in which the factors that do or do not cause changes or results may be controlled or varied as the experimenter desires. (Only one factor may be allowed to vary at one time if the experimenter is to be certain what factor or factors cause the changes or results.)"
Good, Carter V. Dictionary of Education. McGraw-Hill, 1945.

"...the use of cross tabulation is, in effect, an approximation of the controlled experiment. This means that the analyst is really thinking in terms of cause and effect. That is, he has in mind one or more variables, variation in which can be used to explain variation in another variable.

"The cross tabulation of 2 or more attributes or variables is merely a formal and economical method of arranging the data so that the logical methods of proof may be applied. ..."
Goode, William J. and Hatt, Paul K. Methods in Social Research. McGraw-Hill, 1952

"This superiority of scientific inquiry derives from the fact that it is controlled. A process is controlled to the extent that it is efficiently directed toward the attainment of desired objectives."

"In scientific experimentation we control everything that happens. We determine when it shall occur and where. We arrange circumstances and surrounding, atmospheres and temperatures; possible ways of getting in and possible ways of getting out. We take out something that has been in, or put in something that has been out, and see what happens."
Ackoff, Russell Lincoln, et al, Scientific Method. Wiley, 1962.

"In this book the term experimentation refers to a particular kind of research. It identifies those method classes in which the levels

of one or more (independent) variables are altered, so that the effect of these changes on other (dependent) variables may be evaluated by the investigator."

Shontz, Franklin C. Research Methods in Personality. Appleton-Century-Crofts, 1965

Case Study

"Case history: a summary of facts concerning an individual's behavior, environment, family background, and personal history, to which may be added a cumulative record of current information, including test results and anecdotal records."
Good, Carter V. Dictionary of Education. McGraw-Hill, 1945.

"Case method: (1) in research, the use of detailed studies of single individuals as a basis for induction of principles; (2) a methodology of social investigation that concerns itself with the careful examination of everything that is significant in the lives of selected persons, groups, or institutions, emphasis being placed on discovering what is unique to the case under consideration rather than what is characteristic of large numbers; findings are especially related to treatment proceedings; (3) a diagnostic and remedial procedure based on thorough investigation of a person, in order to acquire knowledge of his history, his home conditions, and all influences that may cause his maladjustment or behavior difficulties, the aim being to apply remedial measures."
Good, Carter V. Dictionary of Education. McGraw-Hill, 1945.

"... The intensive study of selected instances of the phenomenon in which one is interested. The focus may be on individuals, on situations, on groups, on communities."
Selltiz, Claire, et al, Research Methods in Social Relations. Rev. ed. Holt, 1959

"The case study...is not a specific technique. It is a way of organizing social data so as to preserve the unitary character of the social object being studied. ...it is an approach which views any social unit as a whole. Almost always, this means of approach includes the development of that

unit which may be a person, a family or other social group, a set of relationships or processes...or even an entire culture."
Goode, William J. and Hatt, Paul K. Methods in Social Research. McGraw-Hill, 1952.

"The...case study...amounts in essence to a careful and thorough examination of the life and behavior of one individual or "case." The same techniques used with individuals may be applied with similar effect in the study of groups of individuals...or to a particular aspect of social behavior.
Hillway, Tyrus, Introduction to Research. Houghton-Mifflin 1956.

Survey

"Survey: an investigation of a field to discover current practices, trends, and norms; may or may not include recommendations based on the data gathered."
Good, Carter V. Dictionary of Education. McGraw-Hill, 1945.

"The systematic collection of data from populations or samples of population through the use of personal interviews or other data-gathering devices."
Festinger, Leon and Katz, David, (eds.) Research Methods in Behavioral Sciences. Holt, Rinehart and Winston, 1965.

"Within the context of scientific research, the survey constitutes a method of data collection that utilizes interview or questionnaire techniques for recording the verbal behavior of respondents."
Phillips, Bernard S. Social Research; Strategy and Tactics. Macmillan, 1965

"The survey typically constitutes a way of obtaining exact facts and figures about a current situation... This method...attempts usually to describe a condition or to learn the status of something, and whenever possible, to draw valid general conclusions from the facts discovered."
Hillway, Tyrus. Introduction to Research. Houghton-Mifflin, 1956.

Research Reviews

"Review of literature: (1) a survey of the printed material dealing with or bearing on a given subject or problem; (2) a summary embodying the findings of such a search."
Good, Carter V. Dictionary of Education. McGraw-Hill, 1945

"One of the simplest ways of economizing effort in an inquiry is to review and build upon the work already done by others. In a study of the type we are discussing here, the focus of review is on hypotheses that may serve as leads for further investigation. Hypotheses may have been explicitly stated by previous workers; the task then is to gather the various hypotheses that have been put forward, to evaluate their usefulness as a basis for further research, and to consider whether they suggest new hypotheses."
Selltiz, Claire, et al, Research Methods in Social Relations. Rev. ed. Holt, 1959.

APPENDIX C.

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THE JOURNAL OF EDUCATIONAL RESEARCH
(Volume 57, Number 2, October 1963)

The Use of "Likability" Ratings and Ability Scores in the Prediction of School Achievement

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AN EARLIER article (4) reported the development of a method for obtaining teacher ratings of students on the trait of "likability" and presented results showing that these ratings were reasonably reliable and significantly correlated with both ability scores and grade-point averages in a sample of high-school seniors. On the basis of these findings and the known relationship of ability to achievement, the possibility of combining "likability" ratings and ability scores was suggested as a means of improving achievement prediction.

In terms of the data from the preliminary study, the expectation that employing such a combination of measures offered better prediction than using either alone came from the fact that, whereas their separate correlations with grade-point averages were .550 and .668 respectively, their combined (multiple) correlation with this criterion was .728. The standard score form of the multiple regression or predictive formula in this instance, as developed previously, was

$$z_1' = .307z_2 + .540z_3, \quad (1)$$

where z_1', z_2, and z_3 represented grade point average, ability score, and "likability" rating, in that order, for any student.

PURPOSE AND PROCEDURE

The purpose of the present article is to report the findings of an investigation in which formula one was used in an actual predictive situation.

The ninth-grade students in one of our junior high schools served as the subjects in this study. Ability scores were available for slightly over 200 of these students, since they had been given the California Test of Mental Maturity (CTMM) near the end of the sixth grade.

"Likability" ratings by teachers were obtained on the students in the manner described previously, except that care was taken to supplement the written instructions with a talk to the teachers. At this personal appearance, additional explanations of the rating technique were given and suggestions made as to how to proceed in discriminating among cases at first perceived as near-equal in "likability." Stress was also put upon the importance of accuracy and independence of judgment in each case. This additional effort at orientation and explanation for the teachers was done in an attempt to improve the reliability of their ratings.

The above part of the experiment was carried out in early December. During the latter part of the same month, the ratings were evaluated numerically, both ability scores and "likability" ratings converted to standard scores, and the calculations of formula one made to obtain the predicted scores of the students at the end of the first semester, which was to occur in early February. Solely on the basis of these predicted grade-point averages, the students were listed in rank order, beginning with the student with highest predicted score. On January sixth, a copy of this list was left with the principal to retain as an indication that the experiment was "predictive" in nature.

Near the middle of February, and after report cards had been returned, the grade-point averages of the students (derived by letting A = 5, B = 4, C = 3, D = 2, and F = 1) were calculated and the students ranked on this basis, beginning with the student of highest average. Thus, two lists of the students--the one of "predicted" and the one of "actual" rank order of achievement--were available for comparison.

RESULTS

First, a word about the reliability of the teacher ratings in this experiment. Using the split-half method, wherein the average of the first half of the ratings for any subject is paired with the average of the second half, the obtained correlation between the halves was .751. When corrected by the Spear-

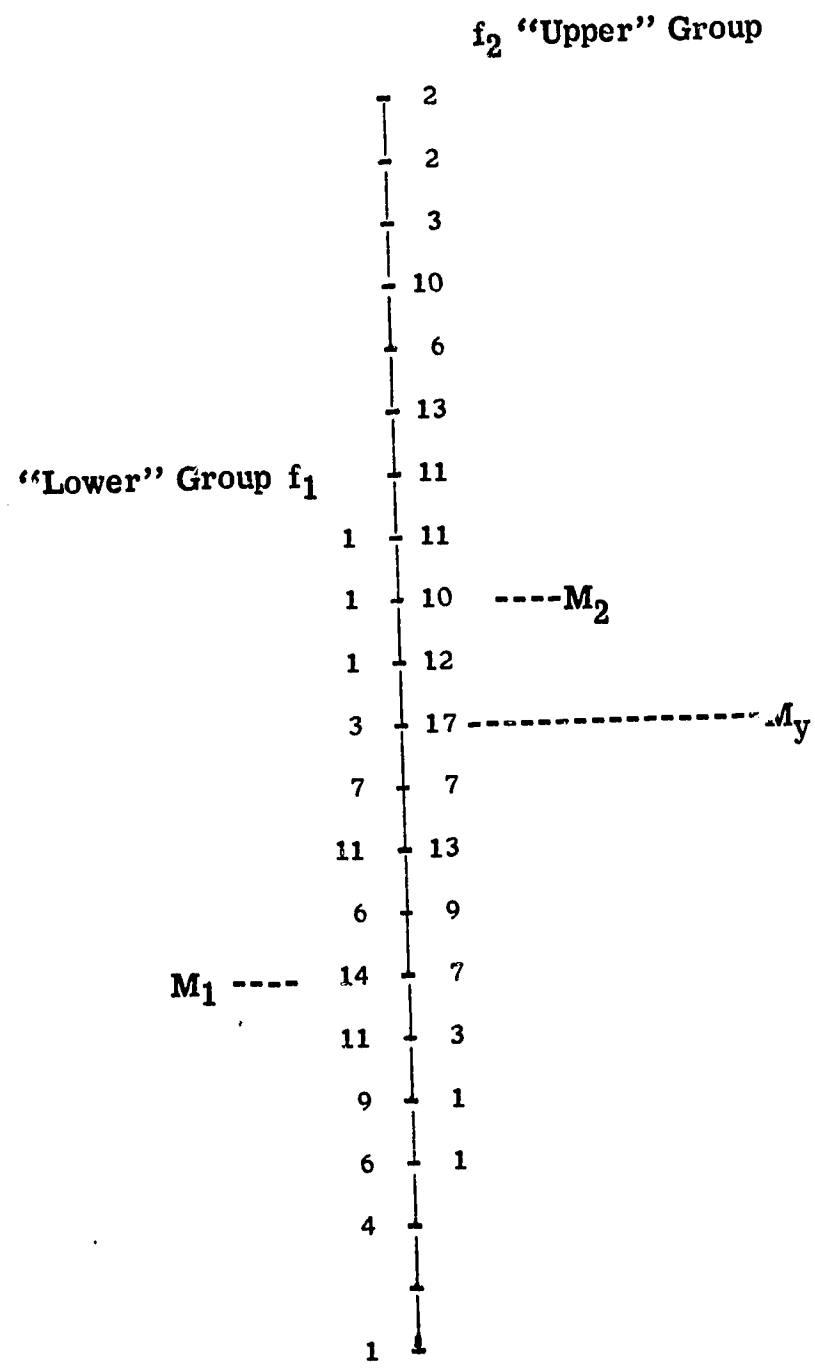

FIGURE 1

DISTRIBUTION OF "LOWER" AND "UPPER" GRADE POINT AVERAGE GROUPS ALONG THE PREDICTED SCORE AXIS

man-Brown formula, the coefficient of reliability becomes .857 which, for ratings of this nature, is judged to be quite satisfactory.

The method of biserial correlation (3) was used to analyze the results on prediction of achievement. To do this, the list of students based on actual rank order of achievement was dichotomized by choosing the grade point average of 3.00 as an arbitrary division point. This gave an "Upper" group made up of those with grade point average above 3.00 and a "Lower" group composed of those with grade point average 3.00 and below. The biserial r between the dichotomized variable of actual achievement and the predicted achievement scores was .783. The ratio of the variance of "predicted" to "actual" achievement, then, becomes .613. This means that under the conditions of this study, use of the variables of "likability" ratings and ability scores in combined form has made it possible to account for about 61 percent of the achievement variance.

The biserial technique of analysis used in this case not only gives an approximate degree of relationship between the variables involved but also affords a convenient and instructive way of perceiving the results. Figure 1, for example, shows the distribution of the "Lower" and "Upper" groups of students along the y--or predicted score--axis. The means of the combined, "Upper" and "Lower" groups (M_y, M_2, and M_1, respectively) and the indicated frequencies within each interval show quite clearly the degree of overlap and, thus, the size of error in prediction.

DISCUSSION

The results presented here have shown that, knowing only the ability test scores and the "likability" ratings of ninth-grade students, it is possible to predict their grade point averages with the degree of accuracy represented in a biserial correlation coefficient of .783 between predicted and actual attainment. This degree of association amounts to a significant departure from chance expectations ($P < .01$) and speaks favorably for the predictive power of equation one under the conditions of the present investigation.

Equation one was developed using data obtained on high-school seniors and indicated at that time "in a retrospective sense" the combination of ability test scores and "likability" ratings that would have given the best prediction of grade-point averages for these students. The fact that use of this equation has resulted in reasonably good prediction for the achievement of ninth-grade students offers some, but not conclusive, evidence for its general applicability at the high-school level. There should be similar experiments with it at other high-school levels, including the seniors, before definite conclusions can be drawn. However, the close similarity of results obtained between "actual" and "retrospective" uses of equation one in the two experiments conducted so far tends to strengthen one's belief that the method can be used with some degree of success at more than one high-school grade level. For instance, the percentage of "errors in prediction" among the highest 100 students in the two cases is essentially the same (21 and 19).

In spite of the favorable results obtained so far with equation one there is still almost 40 percent of achievement variance to be explained. This means that other variables related to achievement must be found and the manner of their contribution studied before increased accuracy of prediction can be assured. A step in the search for other, potentially useful variables was made in the present study. In the case of 11 students, for whom predictions based based on equation one were most in error, the teachers were asked to supply additional information. For those falling below predictions, the teachers were asked: "Why did these students not make better grades?" For those doing better than predictions, the teachers were asked to "Describe these students in terms of their attitude toward school work." Some of the replies are mentioned here.

(a) Why those students falling below predictions did not make better grades:

"Little class recitation."
"Occasionally doesn't do homework."
"Lacks interest, skipped school."
"Slow at getting make-up work in."
"Is satisfied with less than perfection."

(b) Attitude of those students who exceeded predictions:

"Very studious, always makes up her work"
"Very diligent worker."
"Works hard for what she gets."
"Works well in class."
"Very conscientious."

On a purely qualitative basis, these inversely related statements seem to have most in common the factor of "achievement motivation" which in the present context, would appear to have the positive meaning of "desire to make good grades." By somewhat different means, others have arrived at similar variables (1, 2).

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MARY JANE DONALDSON and JOHN F. HARVEY

Library School Instructor Evaluation

Since 1960 students have been asked to evaluate all courses taken in the Drexel library school. Results of the evaluations are tabulated and implications are discussed; they are also compared with similar studies in other disciplines and at other institutions. Summer school courses were better liked than those taken during the year; women instructors scored higher than men; courses in specialized library work ranked higher than others.

In 1960 the Drexel Institute of Technology graduate school of library science intiated a program of evaluation of faculty members by students. Student ratings are obtained for each section taught by full-time instructors during their first three quarters at Drexel, and for the first four courses taught by part-time instructors. Normally the evaluations are obtained in the last class meeting before the final examination.

The evaluations are intended to serve three purposes. Primarily, it is hoped that the ratings will aid the instructor in improving his teaching methods by pointing out specific areas needing improvement and by revealing to the instructor his students' reactions to him, both positive and negative, since "only by accident will the teaching of a man ignorant of the reaction of his class be effective."[1] Second, the ratings assist the administration in judging faculty members' effectiveness. A third purpose is to give students a voice in school administration.

[1] W. R. Wilson, "Students Rating Teachers," *Journal of Higher Education*, III (February 1932), 79.

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Since the 1920's, and especially in the last two decades, student evaluation of instructors has received increasing attention from educators and researchers. In general, this research has shown student evaluation to be reliable and valid. In his survey of the subject in the *Handbook of Research on Teaching*, H. H. Remmers cites various studies which have shown that student ratings were not appreciably influenced by the difficulty of the course, by the halo effect, by the grades given to raters, or by the instructor's popularity in extracurricular activities. Remmers cites further studies showing when twenty-five more ratings were averaged they were as reliable as the better mental and education tests, and when alumni graduated ten years earlier were asked to rate their college instructors, their ratings agreed substantially with those of the same instructors by students currently enrolled.[2]

The use of student evaluation is apparently widespread: in 1960 Stecklein cited evidence that 320 colleges and universities in the United States had used student ratings.[3] Despite the amount of attention given student ratings on the undergraduate level, however, this subject has received little at-

[2] N. L. Gage, ed., *Handbook of Research on Teaching* (Chicago: Rand McNally, 1963), p. 367-68.
[3] *Ibid.*, p. 368.

tention at the graduate level and apparently none in library science. Yet it would seem that ratings might play a particularly important role in library education since, like instructors in other professional schools, most library school instructors have been trained primarily as professional practitioners rather than as teachers, and sometimes "the teachers drawn from the ranks of the profession are inadequately prepared for teaching."[4] For the instructor with little experience or training in teaching methods, student ratings can point out areas on which he must concentrate to increase his effectiveness.

With the hope that a study of the results of student evaluations might provide insights into the problems of teaching library science on the graduate level, a study was made of the five-year Drexel evaluation program. The data upon which the study was based were limited in several aspects: in the first place, since ratings were generally obtained only for part-time and full-time instructors while they were still relatively new to the job, they do not necessarily provide a representative sample of all sections taught; second, the form of rating sheet has undergone slight modifications; and third, in a few cases not all of the data was recorded on the master sheets.

The evaluation forms filled out anonymously by the students consisted of a list of attributes generally recognized to be associated with effective teaching. For each attribute students were asked to rate the instructor on a four-point scale—*excellent*, *good*, *fair*, and *poor*. The rating unit was the individual class section, so if an instructor taught three class sections in a given quarter he received three separate ratings. In compiling the scores for each section a master sheet was made which recorded the number of times each point on the grading scale was marked for each attribute. The total number of marks for each point on the grade scale was then figured. The final rating score was the percentage of all the marks which were at the *excellent* and *good* points of the scale. For instance, if thirty students in a section made a total of 200 evaluation decisions, 180 of which were at the *excellent* and *good* points of the scale, the instructor's rating for that section was 90 per cent.

Also recorded on the master sheet was a list of all voluntary student comments and the rank of that section compared with all other sections rated that quarter. At the end of the quarter—after all course grades had been turned in—a re-

[4] Thelma Eaton, "Who is a Good Library School Teacher?" *Improving College and University Teaching*, II (May 1954), 26.

TABLE 1. FREQUENCY DISTRIBUTION OF STUDENT RATINGS

Scores	All Ratings		Ratings for Part-Time Instructors		Ratings for Full-Time Instructors		Ratings for Women		Ratings for Men	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
96-100	30	12.34	17	12.78	13	11.81	14	12.06	16	12.59
91-95	40	16.46	22	16.54	18	16.36	23	19.82	17	13.38
86-90	39	16.04	21	15.78	18	16.36	16	13.79	23	18.11
81-85	32	13.16	14	10.52	18	16.36	17	14.65	15	11.81
76-80	31	12.75	18	13.53	13	11.81	17	14.65	14	11.02
71-75	21	8.64	8	6.01	13	11.81	11	9.48	10	7.87
66-70	19	7.81	13	9.77	6	5.45	7	6.03	12	9.45
46-65	24	9.87	13	9.77	11	10.00	11	9.48	13	10.23
26-45	7	2.87	7	5.26	....	.....	....	.....	7	5.51
	243	100.00	133	100.00	110	100.00	116	100.00	127	100.00

port was given to the instructor on an evaluation form, and a copy was kept by the administration.

The study considered separate course ratings representing 243 sections taught by eighty-four instructors. In analyzing these ratings the following questions were considered.

1. *What was the range for individual instructors' scores?* The scores ranged from 28 per cent to 100 per cent with the mean being 81 per cent shown in Table 1. Twenty-nine per cent of the ratings were above the 90 per cent level and an equal number below 75 per cent. The widest range for the scores of an individual instructor was 47 points, from 42 per cent to 89 per cent; however, the range of most instructors was considerably narrower, with the average range for instructors rated twice being seventeen points and the average for those rated three or more times being twenty-five points. Only one instructor was included in both the best twenty-five and the poorest twenty-five ratings.

2. *Did a pattern of movement exist in the scores of individual instructors or the ratings as a whole?* At Colorado State College of Education a survey of ratings taken over a period of years found that most instructors made significant improvements with successive evaluations.[5] Riley cites three other studies which found a definite improvement in the performance of faculty members.[6] At Drexel, however, no such trend was apparent, and while some of the instructors did receive successively higher ratings, as many received successively lower ratings or had such varying scores as to show no pattern of movement. Therefore, while Drexel faculty members on a whole learned their teaching weaknesses their resulting teaching seemed no more—or less—effective than before. Of course, this generalization hides the group which did improve and the group which was already very high. As a matter of fact, the mean score of 81 per cent *excellent* and good was itself a quite satisfactory score. But minorities scored low or else had declining scores and were not invited to teach again.

TABLE 2. MEAN SCORES OF FACULTY RATINGS BY YEARS AND QUARTERS

Year:	N	MEAN SCORE
1960-61	26	81.2
1961-62	46	80.5
1962-63	43	83.5
1963-64	60	80.5
1964-65	56	76.2
Quarter:		
Fall	52	79.0
Winter	54	78.8
Spring	43	78.3
Summer	77	82.5

Table 2 shows that the ratings as a whole have recently shown a downward trend. While the average ratings for the first three years ranged from 80.5 per cent to 83.5 per cent, with the academic years 1963-64 and 1964-65 the average score declined to 76.2 per cent. Whether this trend represented an increasingly critical and able student body or a somewhat less effective faculty is not clear.

3. *Was there any connection between favorability of ratings and time of year?* In the Colorado State College of Education survey summer school courses were rated higher than those taught during the regular college year.[7] The same trend was evident at Drexel where summer quarter course ratings averaged 82.5 per cent while fall, winter, and spring quarter averages were 79 per cent, 78.8 per cent, and 78.3 per cent respectively.

[5] W. D. Armentrout, "Relation of Class Size and Other Factors to Student Ratings of Teachers," *Journal of Teacher Education*, I (June 1950), 102.

[6] John W. Riley, Pryce F. Ryan, and Marcia Lifshitz, *The Student Looks at His Teacher* (New Brunswick: Rutgers University Press, 1950), p. 31.

[7] "Relation of Class Size and Other Factors . . . ," *op. cit.*, p. 102.

TABLE 3. COMPARISON OF PART-TIME AND FULL-TIME, AND OF MALE AND FEMALE INSTRUCTORS

	Mean Score	Per Cent of All Ratings	Per Cent of Highest 25 Ratings	Per Cent of Lowest 25 Ratings
Ratings:				
Full-Time Instructors	82.8	45	40	32
Part-Time Instructors	78.9	55	60	68
		100	100	100
Ratings:				
Male Instructors	79.2	52	52	64
Female Instructors	81.7	48	48	36
		100	100	100

More striking than a comparison of average scores, however, was the fact that while summer quarter ratings accounted for only 28 per cent of all the ratings they accounted for 68 per cent of the twenty-five highest ratings.

4. *Which groups of instructors scored highest?* A comparison was made of the scores received by women (48 per cent of all ratings) and by men (52 per cent). Table 3 shows the mean rating for women (81.7 per cent) to have been slightly but not significantly higher than that for men (79.2 per cent). Male instructors made up half of the top twenty-five instructors but two-thirds of the bottom twenty-five instructors.

A similar comparison was made between part-time and full-time instructors. Again the difference was slight, with the mean rating for part-time being 78.9 per cent and for full-time being 82.2 per cent. Part-time faculty members tended somewhat more than full-time to scatter to either extreme. They represented 55 per cent of all ratings but had 60 per cent of the top twenty-five ratings and 68 per cent of the bottom twenty-five. In general, sex and part-time or full-time status appeared to have

TABLE 4. PERCENTAGE OF RATINGS FOR WHICH EACH ATTRIBUTE SCORED HIGHEST

	Per Cent				
ATTRIBUTE	All Ratings	Ratings for Part-Time Instructors	Ratings for Full-Time Instructors	Ratings for Male Instructors	Ratings for Female Instructors
Effectiveness in putting subject across	3	3	4	2	5
Usual preparation for class	16	9	23	14	18
Use of examples	4	4	4	3	5
Stimulation of thought	3	4	3	3	4
Tolerance toward student difference of opinion	25	33	16	30	19
Spirit of helpfulness in and out of class	25	24	27	32	18
Has motivated me to do my best work	1	2	0	0	2
Balance of lectures, class discussion, student reports	0	0	0	0	0
Stimulates exchange of ideas	1	1	0	0	1
Assignments reasonable in length	2	3	1	3	1
Knowledge of and familiarity with subject	50	59	39	48	52
Organization of material	5	3	7	3	7

TABLE 5. PERCENTAGE OF RATINGS FOR WHICH EACH ATTRIBUTE SCORED LOWEST

ATTRIBUTE	PER CENT				
	All Ratings	Ratings of Part-Time Instructors	Ratings of Full-Time Instructors	Ratings of Male Instructors	Ratings of Female Instructors
Effectiveness in putting subject across	18	25	10	21	14
Usual preparation for class	9	11	6	12	4
Use of examples	0	0	0	0	0
Stimulation of thought	29	29	28	35	21
Tolerance toward student difference of opinion	11	5	18	4	20
Spirit of helpfulness in and out of class	3	4	2	2	4
Has motivated me to do my best work	5	6	3	5	4
Balance of lectures, class discussion, student reports	6	8	3	7	4
Stimulates exchange of ideas	4	2	6	3	5
Assignments reasonable in length	7	8	5	3	10
Knowledge of and familiarity with subject	1	1	1	0	2
Organization of material	31	33	28	34	26

little bearing on teaching effectiveness, but the interesting clusters at extremes are hard to explain.

5. *In what characteristics were instructors rated highest? Lowest?* The strongest characteristic was "knowledge of and familiarity with subject," which was a strong point on half of the ratings. "Tolerance toward student difference of opinion" and "spirit of helpfulness in and out of class" were each strong points on 25 per cent of the courses. Table 4 shows no other characteristics to be rated highest on more than 10 per cent of the courses.

The weakest characteristics were "organization of material" (31 per cent), "stimulation of thought" (29 per cent), and "effectiveness in putting subject across" (18 per cent) as seen in Table 5.

It is interesting to compare Drexel strong and weak points with the results of a large-scale rating program carried out among undergraduates at Brooklyn College and reported by Riley, Ryan, and Lifshitz in *The Student Looks at His Teacher*. In the Brooklyn study, as at Drexel, the highest scoring characteristic concerned knowledge of subject matter. Similarly, at Brooklyn the poorest scoring characteristic was "encouragement of thinking," and at Drexel "stimulation of thought" was one of the weakest points. Despite these correspondences, however, there was a significant difference between Drexel and Brooklyn instructors on "organization of subject material"—the third best characteristic of ten at Brooklyn, but the weakest at Drexel.[8]

There were several differences in the weakest and strongest characteristics by sex and by full-time status of faculty members. For instance, while almost one-fourth of the full-time instructor ratings were strong in "usual preparation for class," this was a strong point for only one-eleventh of the part-time instructors who usually had full-time jobs elsewhere in addition to their Drexel teaching. On the other hand, ratings for part-time instructors were 50 per cent higher than for full-time on "knowledge of and familiarity with subject." Students also considered part-time instruc-

[8] Riley, Ryan, and Lifshitz, *op. cit.*, p. 82.

TABLE 6. RATINGS OF TYPES OF COURSES

Type of Course	Mean Score	Per Cent of All Ratings	Per Cent of Top 25 Ratings	Per Cent of Low 25 Ratings
Reference	81.0	19	20	24
Library Materials	78.9	15	4	12
Cataloging	79.8	12	8	12
Administration	79.1	11	12	8
Special Types of Service	82.3	14	28	16
Backgrounds	77.0	12	4	20
Children's Work	88.6	10	20	0
Information Science	79.8	7	4	8
		100	100	100
Basic Required	79.2	29	12	28
Intermediate Required	79.5	25	12	28
Electives	82.0	38	72	36
Information Science	79.8	7	4	8
		100	100	100

tors more tolerant of student difference of opinion, on a two-to-one ratio. Still another significant difference between part-time and full-time instructors lay in the area of "effectiveness in putting subject across" which was a strong point for one-fourth of the part-time instructors but for only one-tenth of the full-time instructors.

An interesting difference between the ratings of male and female instructors was in "tolerance toward student difference of opinion." This attribute occurred as a weak point on ratings of female instructors significantly more often than on ratings of males.

6. *Were electives rated higher than required courses?* Although it may seem natural for students to have been more favorably inclined toward the courses they elected to take than toward required courses, the studies done at Brooklyn College[9] and at Colorado State College of Education[10] found no important difference here. At Drexel, as shown in Table 6, elective courses had a slight but not significantly higher mean than basic and intermediate required courses. Required courses, however, accounted for 54 per cent of all the ratings but only 24 per cent of the highest twenty-five ratings.

7. *Which courses were most highly rated?* When considering the scores of groups of courses the most obvious pattern was the high ratings given to courses dealing with library service to children and young people in school and public libraries. The seven courses in this category were offered twenty-five times for an average score of 88.5 per cent, eight points higher than the overall average. Also, special types of library service, such as medical, law, special, college, etc., were unusually well represented among the top twenty-five courses. It is possible that the somewhat more favorable ratings given school and children's librarianship courses were related to the similarly favorable ratings given in summer quarters, since during summer quarters the percentage of students and of courses in school and children's librarianship is relatively high.

For single courses, the highest score for a required course rated more than ten times was for "Basic Reference Materials" with a mean score of 86 per cent. The lowest mean score for such a

[9] *Ibid.*, p. 87.
[10] "Relation of Class Size and Other Factors . . . ," *op. cit.*, p. 102.

TABLE 7. 25 HIGHEST RATINGS

Instructor	Part-Time or Full-Time	Male or Female	Course	Elective or Required	Class Size	Year	Quarter	Rating—Per Cent
A	F	F	Advanced Selective Cataloging	E	6	...	.....	100
C	P	M	Rare Book Librarianship	E	9	63	Summer	100
D	P	F	Workshop	E	17	62	Summer	100
E	F	F	Adult Education and the Library	E	14	61	Spring	100
G	P	F	Advanced Reference	E	4	60	Summer	100
S	P	M	College and University Library Service	E	9	...	.....	100
T	F	M	Methods of Research in Librarianship	E	4	60	Summer	100
B	P	F	Selection of Library Materials	R	19	...	.....	99
K	P	F	Folk Literature and Its Oral Presentation	E	11	63	Summer	99
Q	P	F	Library Methods Analysis	E	7	62	Summer	99
DD	P	F	Selection of Library Methods for Children	E	20	61	Summer	99
H	P	M	Government Publications	E	22	64	Fall	98
I	F	M	Special Library Service	E	13	61	Summer	98
I	F	M	Special Library Service	E	10	63	Winter	98
CC	P	M	Integration of Science Information Systems	E	5	64	Summer	98
M	P	M	Introduction to Library Services	R	22	61	Summer	98
W	P	M	College and University Library Service	E	23	62	Spring	98
BB	P	F	Selection of Library Materials for Children	E	14	63	Summer	98
A	F	F	Cataloging and Classification	R	10	...	.....	97
G	P	F	Advanced Reference	E	8	64	Fall	97
J	F	F	Selection of Library Materials for Young People	E	21	...	.....	97
I	F	M	Introduction to Library Services	R	22	61	Summer	97
I	F	M	Reference in Science and Technology	R	24	...	.....	97
I	F	M	Reference in Science and Technology	R	26	63	Winter	97
N	P	F	Adult Education and the Library	E	15	62	Summer	97

course was the 74 per cent received by "Library in Society," a required course on the history and sociology of libraries.

8. *Is there any relationship between class size and ratings?* Although class size was not a significant factor in the ratings at Brooklyn[11] and Colorado,[12] small classes at Drexel were rated more favorably than large ones, as Tables 7 and 8 show. The average class size at Drexel was twenty, but the average class size for the highest twenty-five ratings was only 14.2. It should be noted, however, that the average class size for the twenty-five lowest courses—18.76—was also somewhat lower than the over-all average. The mean score for classes having ten or fewer students was 86 per cent, compared to the over-all average of 81 per cent. While small classes comprised only 10 per cent of all ratings, they made up 40 per cent of the twenty-five highest ratings. Furthermore, of all small classes, more than half received scores of 90 per cent or above.

Library science instructors are faced with many teaching problems. In addition to the fact—mentioned earlier—that many of them have had little or no training in teaching methods, they must teach classes made up of students with

[11] Riley, Ryan, and Lifshitz, *op. cit.*, p. 87.
[12] "Relation of Class Size and Other Factors . . . ," *op. cit.*, p. 102.

TABLE 8. 25 LOWEST RATED COURSES

Instructor	Part-Time or Full-Time	Male or Female	Course	Elective or Required	Class Size	Year	Quarter	Rating—Per Cent
V	P	M	Introduction to Cataloging and Classification	R	8	61	Fall	28
F	P	M	Audio-Visual Materials	E	18	62	Spring	34
P	P	M	College and University Library Service	E	23	61	Summer	36
U	P	M	College and University Library Service	E	23	...	.....	37
P	P	M	Selection of Library Materials	R	28	61	Summer	37
O	P	M	Library Methods Analysis	E	13	65	Winter	39
JJ	P	M	Selection of Library Materials	R	15	62	Summer	42
FF	P	F	Reference in Science and Technology	R	12	64	Spring	46
FF	P	F	Reference in Science and Technology	R	24	64	Winter	48
GG	P	M	Reference in Social Sciences	R	25	64	Fall	48
J	P	M	Science Lit. Searching and Abstracting	E	21	...	.....	49
HH	F	F	History of Books and Printing	R	9	65	Winter	51
R	P	F	Introduction of Cataloging and Classification	R	33	62	Summer	52
HH	F	F	Reference in Social Sciences	R	18	64	Fall	53
II	P	M	College and University Library Service	E	31	65	Spring	54
HH	F	F	Library Administration	R	35	65	Winter	56
AA	P	F	Search Strategy	E	12	62	Fall	56
X	P	M	Methods of Research in Librarianship	E	19	63	Winter	56
Z	F	M	Reference in Humanities	R	26	64	Spring	57
EE	P	M	Law Librarianship	E	17	62	Spring	58
T	F	M	Library in Society	R	7	...	.....	58
T	F	M	Library in Society	R	13	64	Winter	59
L	F	F	Introduction to Cataloging and Classification	R	17	65	Spring	59
HH	F	F	Methods of Research in Librarianship	E	11	65	Winter	60
Y	P	M	Advanced Reference	E	11	64	Summer	62

widely varying backgrounds, library experiences, and goals in librarianship. Furthermore, there is the constant problem of achieving a happy balance between theory and practice. Add to this the lack of adequate textbooks and it seems clear that the task facing the library science instructor is not an easy one. At Drexel it is felt that the student rating program is an important method of helping the instructor do an effective job. While ways of improving the rating sheets are constantly being sought the program itself has proven successful. ■■

CHAPTER ONE

Fusion Concept In The Classroom

THE EVALUATION of classroom teaching is a pressing concern of education. In what way can the measure of effective classroom teaching improve education? Identification of means of assessing the effectiveness of teaching would open the way for improving the preservice and inservice education of teachers. Only through education of teachers can classroom teaching be improved. Studies of industrial and business organizations give an important clue toward the means of assessing classroom teaching.

Industrial and business organizations usually manufacture or sell products, or provide services. Virtually every phase of production, service, or sales involves employees. If employees function with increasing effectiveness, then production or service costs decrease or sales increase. Appraisal of effectiveness can be measured with reference to these specific factors.

What contributes to the effective performance of employees? Studies of organizations **(1, 2, 3)** have revealed that effective performance results when:

- Employees feel some sense of job security
- Employees have opportunities to advance in the company
- Employees feel that profits and salaries are distributed fairly

These are but a few examples of how organizations meet felt needs of employees. When organizations recognize and meet felt needs, employees function more effectively. If there are similarities between industrial organizations and classroom organizations, then theories of industrial organizations can be applied to the study of effective classroom teaching. A new and different approach may be promising.

THE CLASSROOM AS AN ORGANIZATION

Broad differences exist between classrooms and factories, but both can be considered "organizations." All organizations tend to function

effectively or they begin to disintegrate. The same human errors that cause a factory to fail could cause a classroom program to fail. Recognizing and meeting individual needs is as critical a factor in the classroom as it is on the assembly line.

The same examples used to describe needs of employees can be applied to pupils. For effective performance—

Employees must:	Pupils must:
• Feel some sense of job security	• Feel they can master the subject and receive passing grades
• Have opportunities to advance in the company	• Have opportunities to receive recognition for above average performance
• Feel profits and salaries are distributed fairly	• Feel grades and other rewards are given fairly

BACKGROUND OF INDUSTRIAL RESEARCH

For a number of years industrial organizations, hospitals, and banks have been studied by the Yale University Labor and Management Center. Two pioneers in organizational research associated with this center are E. Wight Bakke and Chris Argyris **(2, 3, 4, 5, 6)**. They have assumed that both an organization and the members of an organization need to fulfill goals.

The goals of the organization may or may not be compatible with those of its members. For example, a particular plant may have the goal of increased production per worker to reduce costs. Individual workers may strive to decrease production as a means of preventing layoffs. The point is not so much a matter of reasonable or "correct" needs or goals but rather the perceptions of the individuals as to needs or goals.

In studying organizations, Bakke and Argyris have discovered that an organization makes demands upon its members. Similarly, the individual member seeks a working environment in which his needs are met. The needs may conflict or they may fuse. When an individual's perceived needs and organizational goals are in harmony, a high degree of fusion exists. To the extent that they conflict a low or negative fusion exists.

A MODEL OF THE FUSION CONCEPT

The fusion concept is illustrated for a classroom situation in Figure 1. The large rectangle represents the cultural setting. The setting includes the demands of the nation, state, and community as well as the

specific policies and procedures under which the school operates. The inner rectangle represents the physical environment. This may be controlled by the teacher and pupils whereas little control may be exerted over the cultural field. The two ovals represent the two dimensions of

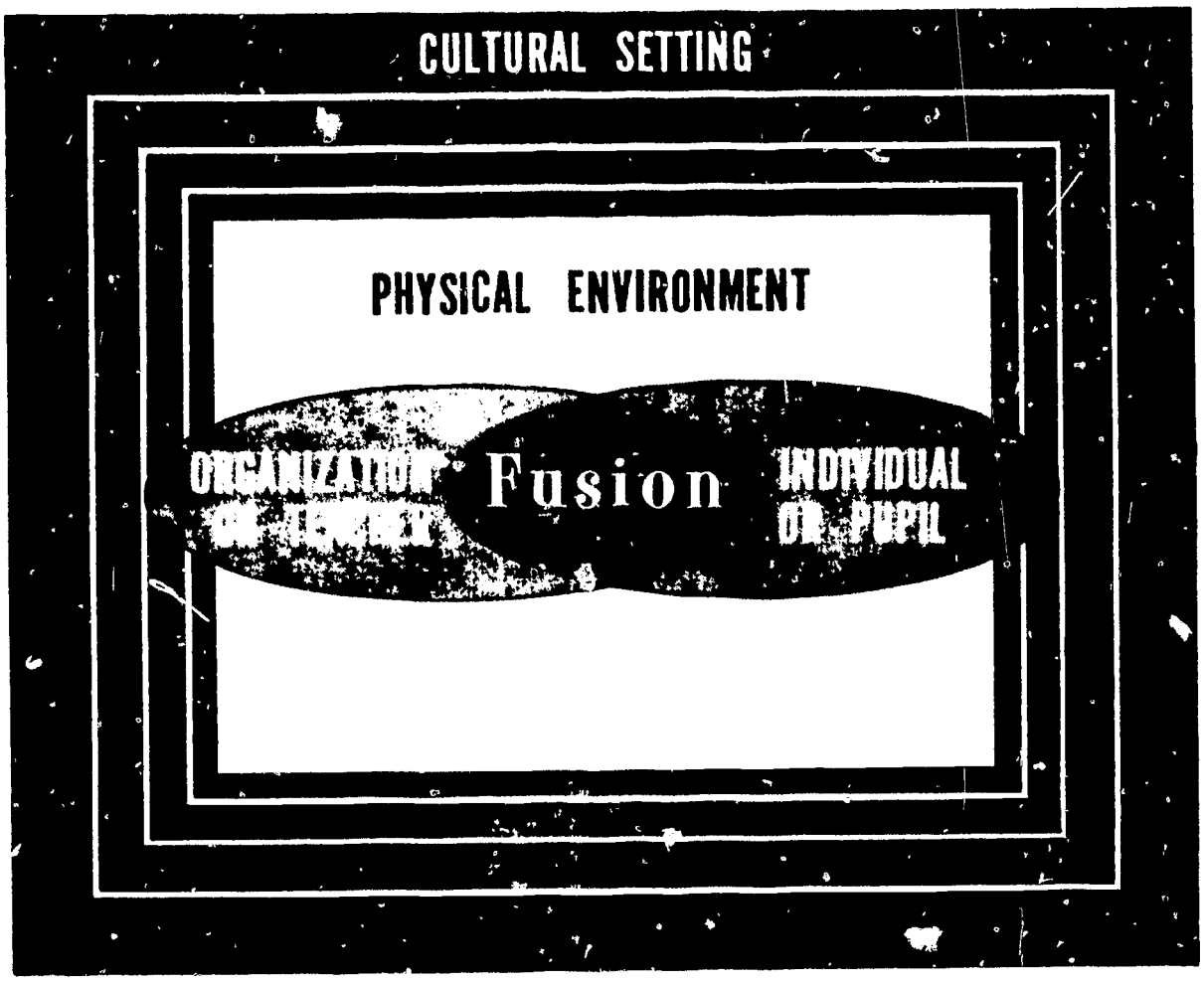

Figure 1. Diagram of the Fusion Concept

the fusion process. One oval represents the organization or its agent, the teacher; the other represents the individual within the organization, or the pupil. The extent to which the ovals overlap indicates the degree to which the needs and goals of the organization and those of the pupils are in harmony. That is, the overlap **(Fusion)** represents the extent of fusion.

APPLYING THE FUSION CONCEPT TO THE CLASSROOM

The curriculum is the means by which educational purposes are reached. Curriculum should result in the maxim m development and educational growth of children as individuals, as social beings, and as citizens in a democracy. Thus, the needs and interests of children and

of society must be the basis for the curriculum. Classroom programs succeed or fail to the degree that they meet those needs and interests. The part of the classroom program which meets pupil needs and interests is promoting the self-actualization or self-fulfillment process. Quite simply, the self-fulfillment process takes the immature, dependent, egocentric child and helps him develop away from infancy.

Basic trends in the process of self-fulfillment have been postulated by Bakke and Argyris (6). They maintain that all people in our culture tend to move from:

- A passive to an active state; from a state where their actions are initiated by others to a state where they initiate action
- The ability to behave in only a few ways and in a rigid manner to the ability of behaving in many different ways and in a complex manner
- The state of being in a subordinate position to a more equal or superordinate position
- A state of being highly dependent upon others to a state of independence and finally interdependence
- A state of receiving and incorporating aspects of culture to a state of controlling, redefining, using, and helping others incorporate these aspects of culture.

Byrnes and Mullen (7) used the preceding trends to discover the preferences of administrators, teachers, and pupils in a school system. Interview techniques, which had been used in studies of industrial organizations, were utilized. Their investigation identified the following pupil preferences:

1. Social-contact-seeking
2. Variety-seeking
3. Activities-minded
4. Independence-seeking
5. Vocation-minded
6. College-oriented
7. Marks-oriented
8. Fair-control-seeking
9. Leader-opportunity-seeking
10. School-work-rejecting
11. Humor-seeking
12. School-accepting
13. Self-expression-seeking
14. Help-seeking
15. Dependence-seeking
16. Participation-minded
17. Recognition-seeking
18. Failure-avoiding
19. Challenge-accepting
20. Success-seeking
21. Sociable-"A"-student accepting
22. School-rejecting
23. Academic-minded
24. Motivation-seeking
25. Service-rendering
26. Routine-seeking

ORGANIZATIONAL PROCESSES*

One dimension of the fusion process may be studied through the goals of pupils in a classroom. A second dimension is concerned with the goals of the classroom organization. Seven processes are believed to be operational if a classroom program is functioning. The classroom organization makes demands upon the pupils as it utilizes these processes to achieve its goals.

Workflow Process

In the industrial organization, the manufacturing of products is the goal. In the classroom situation, the goal is pupil learning. The procedure by which learning is brought about is the workflow process.

Authority Process

In order to direct behavior in the interests of the organization and its participants, an individual or a group of individuals must assume responsibility. Authority rests with the teacher in the classroom organization; however, the means of supporting the workflow process may be shared with pupils in planning, establishing standards, and maintaining classroom control.

Reward and Penalty Process

Motivating forces must be present if individuals are to behave in a way required by the organization and its participants. The classroom forces by which pupils are induced to learn are included in the reward and penalty process.

Maintenance Process

People, materials, and ideas used by the organization and its participants must be perpetuated or replaced. The quality and quantity of resources required for learning are supplied in the classroom through the maintenance process.

Identification Process

Every organization must develop high morale for its members. Pupils identify differently with each classroom depending upon their perceptions of its uniqueness and significance.

Communication Process

The communication process makes possible the exchange of information, ideas, feelings, attitudes, and values utilized in all organizational

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*Adapted from Bakke and Argyris (6).

activities. The extent of interaction and understanding in the classroom depends upon an adequate communication process.

Evaluation Process

An organization fosters activities which establish criteria for and define levels of importance for people, materials, ideas, and behavior. People, material, ideas, and behavior must be rated and allocated to the various levels of importance. In the classroom situation, evaluation must be recognized and provided for as an ongoing process.

Interdependence of Processes

The seven processes described above* operate if an organization may be said to exist. While there is some degree of independence, the processes are strongly dependent upon one another. For example, only the authority process directs behavior, only the workflow process defines tasks, while the reward and penalty process is the only one which rewards or penalizes participants. However, the behavior directed by the authority process would not exist without the workflow process. Similarly, no participant may be rewarded unless he behaves in an accepted manner while performing a task.

Figure 2 illustrates the operation of the organizational processes. It depicts the classroom striving to reach its goal through the seven

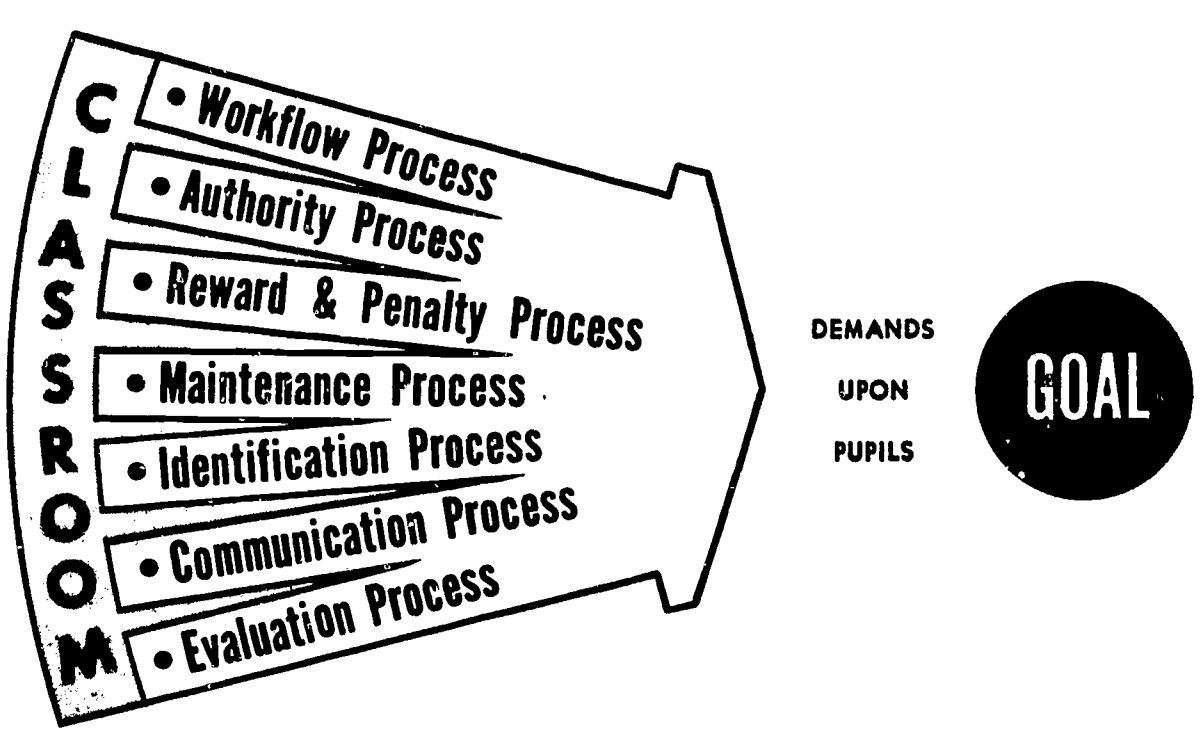

Figure 2. The Organizational Processes

*A memory device for these organizational processes is WARM ICE.

processes. Pupils are moved toward the goal by the demands of these processes.

An illustration similar to that of Figure 2 shows the demands of pupils upon the classroom. Figure 3 indicates the pupil's drive toward self-fulfillment by expressing his needs and preferences.

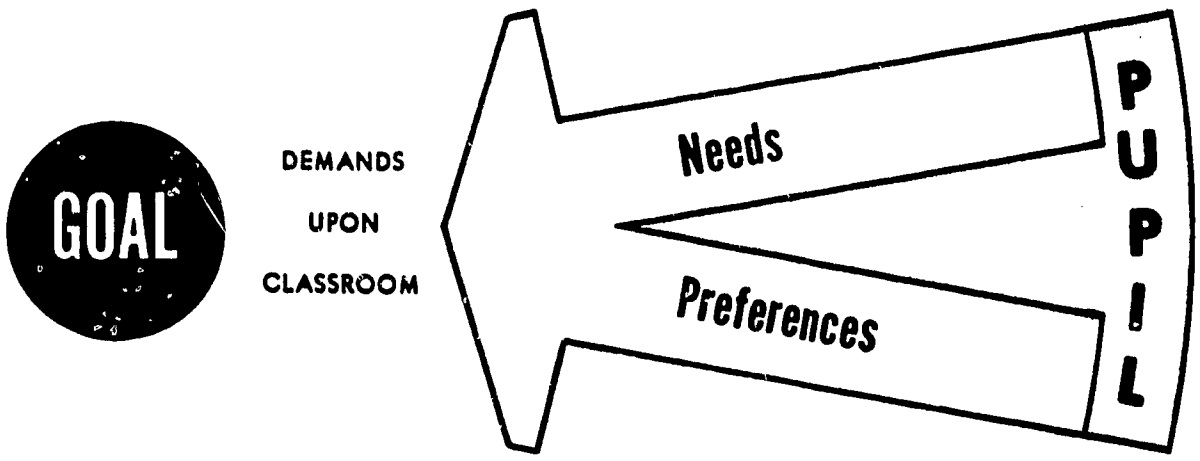

Figure 3. The Self-fulfillment Process

Figures 2 and 3 can be combined to illustrate the movement toward goals—movement performed simultaneously by both the organization and the individual. The overlapping areas indicate similar goals or the fusion of goals.

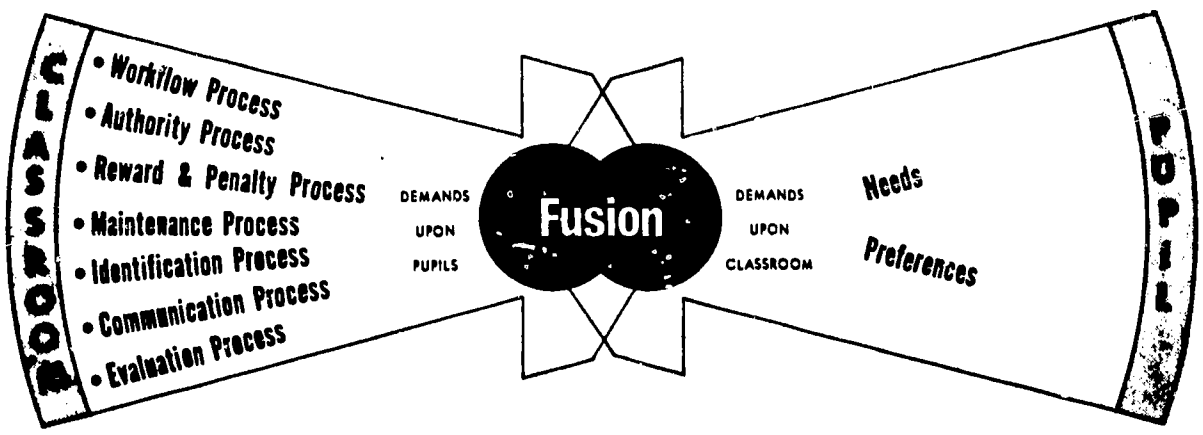

Figure 4. Combined Action of the Classroom and Pupil

Ideally, as shown in Figure 4, the goal of the classroom would be identical with that of the learner. Each classroom should seek the self-fulfillment of every pupil. Thus, goal conflicts between organization and individual should be nonexistent in the classroom. Unfortunately, not all pupils pursue self-fulfillment through means which meet the approval of all teachers. Some pupils express needs and preferences

which appear to oppose the purposes of the classroom program. If teachers recognize and redirect the opposing needs and preferences of pupils, or devise purposeful tasks which take into account pupil needs and preferences, then the forces which interfere with learning are diminished or eliminated. Fusion is increased as conflicts are decreased.

A STUDY OF PUPIL PREFERENCES AND SATISFACTIONS

The investigation of pupil preferences and pupil satisfactions is a first step toward the application of the fusion theory. This dimension of the fusion process was investigated in a recent doctoral dissertation at George Peabody College for Teachers **(9)**. The purpose of the study was to determine the relationship between teacher responses to questions from the Ryans *Characteristics of Teachers* study **(11)**, and the degree to which teachers, as they attempt to fulfill the goals of the school organization, establish classroom situations which take into account the needs of pupils. The study, which forms the basis for this publication, is reported further in Chapter Two.

Several limitations of this study are evident. An untested assumption was made that the teachers involved were attempting to reach the goals of the school. Teachers, of course, have personal needs and goals which may conflict with those of the school. If these personal needs and goals interfere to any great extent, pupils are less than satisfied in realizing their preferences.

In this study, pupil preferences are regarded as felt needs. These preferences may be different from the actual needs of pupils—possibly a contrast between artificial and real needs. The school strives to meet the real needs of pupils. If pupils have needs which are dissimilar and not satisfied, learning may suffer. For example, pupil learning is an essential goal of the classroom. For pupils who seek knowledge, the goals of the classroom and of the pupils coincide or fuse. However, numerous other needs and preferences exist for pupils. The need and preference for social contact is high on the list, according to Coleman **(8)** and Byrnes and Mullen **(7)**. The classroom which provides for social contacts as it provides learning experiences is more effective than one which does not.

This chapter has been concerned with an explanation of the fusion concept, the statement of assumption or hypotheses from previous studies, and an attempt at minimizing the problems of semantics. The details of the fusion instrument and its development are pursued in Chapter Two.

CHAPTER TWO

The Fusion Instrument

THE FUSION INSTRUMENT, described here, was designed to apply one dimension of the fusion concept—that of pupil preferences and satisfactions. It was built on the findings from studies of industrial and educational organizations.

DEVELOPMENT OF THE INSTRUMENT

The pupil questionnaire used in the study was designed to measure the preferences and satisfactions of pupils in classroom situations.* Construction of the questionnaire was based upon the twenty-six pupil preferences identified by Byrnes and Mullen (7), the trends in the self-fulfillment process according to Bakke and Argyris (6) and upon the organization processes defined in Chapter One.

The twenty-nine statements or classroom situations in the instrument were developed in connection with the following organizational processes: workflow, authority, reward and penalty, maintenance, identification, and communication. Since the evaluation process is inherent throughout the previous six processes and the instrument developed for the study is evaluative, no set of questions was grouped under the evaluation process.

The list of classroom situations was refined through pre-trial runs and through interviews with pupils who were not involved in the trial or study runs. The instrument was also administered to and examined by twenty-one graduate students in an educational supervision course.

CHARACTERISTICS OF THE INSTRUMENT

In addition to a pupil-teacher fusion score,‡ the pupil questionnaire may be analyzed to determine specific weaknesses. Weaknesses are related to breakdown in one or more organizational processes. By item analysis, teachers can find the classroom situations for which pupils

*See Appendix A for the instrument and Appendix B for directions for administering.

‡See pages 11-12.

indicate a low degree of satisfaction. Their preferences concerning each particular situation are also revealed in item analysis. This section combines three to six classroom situations with each organizational process. If weaknesses are revealed, then the process which is breaking down can be identified and plans can be made to strengthen the process.

Processes	Class Situations
WORKFLOW	All the work is done within the classroom Some of the work is done outside the classroom The tasks are few and similar The topics or activities are easy to master I have opportunities to express my abilities and talents The topics or activities are a combination—with some routine and some variety
AUTHORITY	The teacher assumes full responsibility for the classroom control The teacher shares with the pupils the responsibility for classroom control The teacher assumes full responsibility for the learning situation The teacher shares with the pupils the responsibility for the learning situation I have an opportunity to exercise leadership
REWARD AND PENALTY	I am prepared for obtaining a job or for entering college My school performance is recognized by others (teacher, pupils, parents) Grades, other rewards and penalties are clearly defined and fairly given I am treated in a way which makes me want to learn The grades truly measure what I have learned I am helped to be a better person—not necessarily for work or college
MAINTENANCE	Help is offered and I feel comfortable in accepting it I am able to help others I have opportunities to bring ideas, suggestions, and resources to discussions, topics and activities

Processes	Class Situations
IDENTIFICATION	The teacher is one for whom I want to work or study I have an opportunity to get to know other pupils I have an opportunity to get to know the teacher I find interesting and challenging work
COMMUNICATION	I know what is expected of me and what is to be done Most of the time is spent having pupils discuss the material Most of the time is spent having explanations and clarifications from the teacher Most of the time is spent with the teacher's questions on the topic answered by pupils Most of the time is spent preparing, presenting, or discussing projects, ideas, activities relative to the current topic or activity

SCORING THE INSTRUMENT

Numerical values were assigned to the levels of preference and the degrees of satisfaction. The values for the preferences are: *Strongly Prefer,* 2; *Prefer,* 1; *Prefer Not,* 1; and *Strongly Prefer Not,* 2. The values for the degrees of satisfaction are: *Very Satisfied,* +2; *Satisfied,* +1; *Not Satisfied,* —1; and *Very Dissatisfied,* —2.

Each statement in the questionnaire is scored as the cross product of the preference value and the satisfaction value (i.e., preference value times satisfaction value). For example, a statement which is checked as *Strongly Prefer* and *Very Satisfied* would be scored as 2 x +2 or +4. A statement checked as *Prefer* and *Not Satisfied* would be scored as 1 x —1 or —1.

By summing the scores (adding the positives and subtracting the negative scores) for the individual statements, an actual expression (a.e.) score for each pupil is obtained. A maximum expression (m.e.) score is twice the sum of all preference values. Thus, maximum expression is a score obtainable *if and only if* each statement received an expression of *Very Satisfied* regardless of the preference reaction. The pupil fusion score is the ratio between the actual expression and the maximum expression (i.e., a.e. ÷ m.e.). Finally, the fusion score

for the teacher or classroom is the arithmetic mean of the pupils' scores.

In the following formulas A, B, C, D, are the values for *Strongly Prefer, Prefer, Prefer Not,* and *Strongly Prefer Not,* respectively. W, X, Y, Z are the values for *Very Satisfied, Satisfied, Not Satisfied,* and *Very Dissatisfied,* respectively. P.F. is pupil fusion, T.F. is teacher fusion, and, N is the number of individual scores for pupils in the class.

The following formulas express the scoring procedure:

$$\text{a.e.} = \Sigma\,[WA + WB + WC + WD + XA + XB + XC + XD + YA + YB + YC + YD + ZA + ZB + ZC + ZD]$$

$$\text{m.e.} = 2\Sigma\,[A + B + C + D]$$

$$\text{P.F.} = \frac{\text{a.e.}}{\text{m.e.}}$$

$$\text{T.F.} = \frac{\Sigma\,\text{P.F.}}{N}$$

RELIABILITY OF THE INSTRUMENT

A pilot study was conducted with the high school teachers and pupils of the Peabody Demonstration School during the summer of 1962. Sixteen teachers and one class for each teacher were involved.

The purpose of the pilot study was to determine the reliability of the fusion instrument. At the same time, a twenty-item teacher questionnaire, adapted from the Ryans *Characteristics of Teachers* study (11), was also tested. This latter instrument served as the check for the pupil questionnaire in terms of its validity as a measure of effective classroom teaching. The teacher questionnaire is presented and described in Appendix C.

For the fusion instrument, the product-moment correlation coefficient of .78 was obtained by using split halves of each class. The procedure was to collect pupil questionnaires only after all pupils had completed the instrument in each classroom; number the questionnaires by classes, and compute and compare the fusion score for odd-numbered pupils against even numbered pupils for each teacher.

Pupils were interviewed concerning the pupil questionnaire. In all cases, pupils responded positively toward the instrument. They found it meaningful, not difficult to complete, and felt it was not fatuous. Several volunteered the comment that they enjoyed the opportunity to express themselves.

VALIDITY OF THE INSTRUMENT

By virtue of its construction, the fusion questionnaire measures the preferences and satisfactions of pupils. But does it measure effective classroom teaching? If teachers who have the same characteristics as those judged highly effective by trained classroom observers also score high on the fusion instrument, then there is validity in using the fusion instrument to measure effective classroom teaching.

A study (9) to determine the relationship between the fusion score and teachers' responses to items adapted from the Ryans study was conducted at Rutherford Central High School, Murfreesboro, Tennessee. The thirty-one teachers involved were all teachers of academic fields.

An analysis of characteristics such as major teaching field, highest degree held, years of teaching experience, and certification showed the teachers to be a representative sample of American public high school teachers. However, for one criterion—the number of male teachers among the total of thirty-one—the academic faculty of Central High School was significantly different from the total population of American high school teachers. Men and women teachers would be fifteen and sixteen respectively in most groups of thirty-one high school teachers (10). At Central High School there were eight men and twenty-three women teachers.

Information on the community, school, and teachers was obtained. The purpose of the study was explained to the faculty, and the teachers involved were asked to complete a questionnaire. The twenty-item teacher questionnaire was scored in terms of agreement with responses by Ryans' group of highly effective secondary school teachers (11). With a possible range of zero to twenty, the thirty-one teachers participating in the study had scores ranging from three to fourteen. The mean was 9.2 with a standard deviation of 3.1.

A fusion score was obtained from the results of the pupil questionnaire. Each teacher selected one class to which the instrument was administered. The possible range of fusion scores is —100 to +100. For the thirty-one teachers in this study, the actual range was +1 to +73. The mean fusion score was 40.6 with a standard deviation of 19.6.

The results of the teacher questionnaire and the fusion instrument were compared and proved to have a high correlation ($r = .85$). The original hypothesis of relationship between selected characteristics of teachers and classroom fusion was therefore accepted. The high cor-

relation supports the belief that teachers who have the same characteristics as those judged highly effective by trained observers *are* teachers who are regarded by pupils as providing classroom opportunities for the satisfaction of pupil preferences.

In summary, the fusion instrument presented in this chapter has been determined to be a reliable and valid measure of one aspect of effective teaching—that of recognizing and meeting the needs of pupils. Because of its construction, the pupil questionnaire has diagnostic values. Specific sections can be analyzed in order to pinpoint areas of breakdown in the organizational processes. Furthermore, an entire faculty, school-wide or system-wide, can assess the degree to which pupil preferences are satisfied through the use of the fusion instrument.

CHAPTER THREE

Applying The Fusion Concept

THE MEASUREMENT of pupil preferences and satisfactions admittedly is only one step in applying the fusion concept to the classroom. It is an important step, however, for there are definite implications for the preservice and inservice education of teachers.

PRESERVICE EDUCATION

During the preservice education of teachers, attention should be focused on the need for the recognition of pupil preferences. Various means for determining pupil preferences and needs should be explored. Ways should be sought to provide opportunities for the satisfaction of these needs and preferences through sound and wholesome educational experiences. In other words, satisfaction of pupil needs and preferences should be attempted within the confines of school goals.

One approach would be to have teacher trainees assess their own needs and preferences through the use of the fusion instrument and class discussion. Professors and students could then plan ways of meeting these needs and preferences while accomplishing the purposes of the particular course. Prospective teacher candidates might thus realize that most, but not all, preferences may be satisfied in the class situation. They can recognize the self-actualization or self-fulfillment trends implied in their own preferences.

Demonstration or supervising teachers for the observation and practice teaching experience should be carefully selected. These educators may have great influence on prospective teachers and should be those who work to recognize and satisfy the needs and preferences of their own pupils. The seven organizational processes (workflow, authority, reward and penalty, maintenance, identification, communication, and evaluation) will be recognized by the astute observer. Teachers engaged in the supervision of teacher trainees should be those with high positive fusion scores.

Once prospective teachers begin practice teaching or internship

experiences, they will need to assess the preferences and satisfactions of their pupils. With the help of the college supervisor, student teachers should analyze the fusion instrument and identify the classroom organizational processes which may be breaking down. In this manner, specific weaknesses can be determined and plans made to strengthen the process or processes.

INSERVICE EDUCATION

Even veteran teachers should be encouraged to administer a fusion instrument to their classes periodically. Inservice education programs can provide time to train teachers in administering the instrument and interpreting the findings. With the help of instructional leaders, teachers can analyze the results in light of the classroom organizational processes. The procedure would be similar to that which is followed by the college supervisor and the student teacher.

The fusion concept lends itself to a self-help evaluation procedure. Classroom teachers can apply the concept, and measure classroom fusion independently of rating devices and their accompanying fears. An entire school or system can use the fusion instrument for self-evaluation. If teachers and administrators prefer, not only pupils but teachers and schools can be involved without identification. Results from a completely anonymous study would identify major preferences of pupils and pinpoint major breakdowns (if any) in the organizational processes. Instructional planning and inservice education could then be directed toward general rather than specific areas of improvement.

One important caution is necessary. As with any new or potentially threatening undertaking, full understanding and cooperation among teachers must be obtained. It needs to be clear that the administration of the instrument and analysis of the results are not part of an evaluation device for rating teachers but rather a means of assisting them to improve classroom teaching.

FURTHER RESEARCH

This report has been confined to a single dimension of the fusion concept. To be sure, the background in Chapter One lays a foundation for the entire concept; but, the study of pupil preferences and pupil satisfactions with the meeting of preferences is only a first step. Further research is needed in the following areas:

1. An instrument should be devised to measure school organizational fusion. Such an instrument would measure teacher needs and

preferences as well as their satisfactions, as teachers function within the demands of the school administration. A second phase of this research would be to determine the relationship between school fusion and classroom fusion. Do teachers who themselves have opportunities to move toward self-fulfillment do a better job of helping their pupils move toward self-fulfillment?

2. One of the objective methods of determining the extent to which a classroom moves toward its goal is the measure of pupil growth or gain. Further research should answer the question regarding the relationship between pupil growth and classroom fusion. The analysis should be made in terms of an individual child's growth and his fusion score as well as in terms of the class, school, or system growth and fusion scores. The implication here is that the satisfaction of pupil needs and preferences removes barriers to learning, and teachers with high fusion scores free children to learn.

3. The effect of homogeneous grouping upon the various levels of pupils is a vital concern to instructional leaders. The fusion instrument should be administered to pupils before homogeneous grouping, during homogeneous grouping, and after some are returned to heterogeneous groups. A carefully designed study could determine the effects on pupils of grouping by using control and experimental classes. A second phase of this research could reveal how teachers are affected by grouping of pupils. Some teachers may obtain higher pupil fusion scores under homogeneous grouping conditions; others may have higher pupil fusion scores under heterogeneous grouping conditions. If a fusion instrument is devised and used which measures school organizational fusion as described in Number 1, above, then the relationship between grouping and teacher-school fusion may be determined.

4. The fusion concept should be studied in situations where methods of evaluating effective classroom teachers have been constructed and followed. Pupil ratings of teachers appear to be the most valid measure now employed. Are there relationships between existing methods of evaluating teaching and fusion scores? Do pupils with high fusion scores rate teachers higher than other pupils do? Do teacher ratings fluctuate with fusion scores? These and other questions concerning the measurement of effective classroom teaching should be answered.

5. Measures of the attitudes of preservice and inservice teachers toward teaching, toward self, and toward others should be compared with their fusion scores. If there are relationships, then the effects

upon pupils by teachers with various personalities or attitudes could be determined. If significant relationships exist between fusion scores and pupil growth—or other measures of effective teaching—and between fusion scores and personality ratings, then colleges and school systems may have a new and useful screening aid.

SUMMARY—THE FUSION CONCEPT

Effective classroom teaching can be studied from a concept based upon industrial organizational research. The fusion concept views the classroom as an organization making demands upon pupils. Demands are imposed in order that the classroom may achieve its goals. Similarly, the pupil makes demands upon the classroom as he strives toward self-fulfillment.

From industrial studies, it is evident that the needs and preferences of the organization are often in conflict with those of the individual. The extent of conflict in the classroom-pupil situation should be almost nonexistent. In other words, goals of the classroom should fuse with those of the pupil. Teachers can create situations which provide for the preferences of pupils or redirect unwholesome needs and preferences of pupils. Such practices lead to high fusion, and teachers with high fusion scores are regarded as more effective teachers.

It is possible to measure classroom fusion. One dimension of the fusion process involves the preferences of pupils and the degree to which pupil preferences are satisfied within the framework of the classroom objectives. An instrument for measuring pupil preferences and satisfactions was presented in Chapter Two of this report. The instrument has been found to be reliable and valid. It can be administered by classroom teachers and scored by hand or by data processing machines.

The fusion concept has significant implications for the preservice and inservice education of teachers. The next steps involve further research to determine other educational applications, and to check further upon those made explicit in this report. Utopian conditions are a long way from being achieved in the classroom. It is hoped that this study has provided some direction toward improved classroom programs.

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APPENDIX E

SAMPLE FORM FOR CANDIDATE TERMS FOR ERIC

Kind of Document	Educational Establishment (or part of)	Person Studied	Attributes or Actions (of terms in any column)	Curriculum	Teaching and Learning Methods and Administration	Testing, Evaluation Measurement	Agents or Means(of Col. 7)

Identifiers: